

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 14217 (1994): Miner's cap lamp batteries (alkaline type)
[ETD 11: Secondary Cells and Batteries]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



खनिक टोप लैम्पों की
बैटरियाँ (अलकली टाइप) — विशिष्टि

Indian Standard

MINER'S CAP LAMP BATTERIES
(ALKALINE TYPE) — SPECIFICATION

UDC 621.355.8 : 622.474

© BIS 1994

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by Secondary Cells and Batteries Sectional Committee had been approved by the Electrotechnical Division Council.

This standard is intended for use in batteries (alkaline type) for miner's cap lamp.

In the preparation of this standard considerable assistance has been derived from BS 4945 : 1973 "Specification for miner's cap lamp assemblies", issued by British Standards Institution.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MINER'S CAP LAMP BATTERIES (ALKALINE TYPE) — SPECIFICATION

1 SCOPE

1.1 This standard covers performance and other requirements, and methods of tests for alkaline batteries of nominal voltage of 3.6 V or 2.4 V and of nominal capacity of 13 Ah for use with miner's cap lamp.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard :

IS No.	Title
1069 : 1964	Water for storage batteries (revised)
1248 (Part 2) : 1983	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (second revision)
1885 (Part 8) : 1986	Electrotechnical vocabulary: Part 8 Secondary cells and batteries (first revision)
10918 : 1984	Specification for vented type nickel cadmium batteries

3 TERMINOLOGY

3.1 For the purpose of this standard, the following definitions in addition to those given in IS 1885 (Part 8) : 1986 and IS 10918 : 1984 shall apply.

3.1.1 Type Tests

Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general quality and design of a given type of battery.

3.1.2 Acceptance Tests

Tests carried out on samples selected from a lot for the purpose of verifying the acceptability of the lot.

3.1.2.1 Lot

All batteries of the same type, design and rating, manufactured by the same factory during the same period, using the same process and materials offered for inspection at a time shall constitute a lot.

3.1.3 Routine Tests

Tests carried out on every battery.

4 MATERIAL

4.1 Container

Container shall be made of high impact proof nylon or poly-carbonate or any other impact resistant suitable plastic material for mining applications.

4.2 Electrolyte

The potassium hydroxide solution used for the electrolyte in the battery shall conform to 3.5 of IS 10918 : 1984.

4.3 Water

The water used for the electrolyte in the battery shall conform to IS 1069 : 1964.

5 CONSTRUCTIONAL AND GENERAL REQUIREMENTS

5.1 General

Battery for miners cap-lamp shall be complementary unit of the cap-lamp. It shall be robust and durable in construction and suitable for use in underground service. When used with the cap-lamp assembly, the battery shall offer no possibility of an explosion hazard in mines in which dust, flammable gases or vapours may be present or of bodily hazard to the miners due to spillage of electrolyte.

5.2 Container and Lid

5.2.1 The container and cell lids shall be of stainless steel/high impact proof nylon. The container shall comprise two/three cells and shall conform to the maximum overall dimensions shown in Table 1.

Table 1 Dimensions of Container and Lid

Battery Voltage V	L(mm)	W(mm)	H(mm)
3.6	140	65	185
2.4	120	60	185

5.2.2 Means shall be provided for attachments to fix the battery to a belt. Provision shall be made for securing a protective top cover to the battery. An entry port giving access to the individual cells of the battery for initial filling and subsequent topping up of electrolyte shall be provided on the outer face of

the container. The port shall be provided with a plug. Cell lids shall be securely sealed to the box. The seal shall prevent leakage of electrolyte under normal conditions of use.

5.3 Cell Post Sealing

The seal between cell post and cell lid shall prevent electrolyte leakage under normal conditions of use.

5.4 Cell Venting

Suitable venting arrangements shall be provided to permit free escape of gases produced inside each cell, preventing at the same time any leakage of electrolyte.

5.5 Fuse

The battery shall have provision for a replaceable cartridge type or totally-enclosed fuse unit.

NOTE — The fuse is intended for restricting the amount of current flow between the conductors of the cord, if short-circuited just outside the battery container or the cord armour, to such a value as will not produce sparks that will ignite an explosive mixture of methane and air.

5.6 Terminals

The terminals of the battery shall be so designed and constructed and so disposed that they are not likely to become short circuited.

5.7 Mass

The mass of the battery when filled and charged shall not exceed 2.0 kg for 3.6 V and 1.5 kg for 2.4 V system.

- e) Any other special marks(s) specified for safety requirements.

6.1.1 The positive terminal location shall be marked on the container with a positive symbol (+).

6.2 BIS Certification Marking

The battery may also be marked with Standard Mark.

6.2.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 TESTS

7.1 Classification of Tests

7.1.1 Type Tests

The tests given in 7.1.1.2 shall constitute the type tests

7.1.1.1 Number of samples

Six samples shall be drawn at random for the type tests by the testing or the inspecting authority.

7.1.1.2 Sequence of tests

The sequence of type tests shall be as indicated in the schedule below:

Test	Battery Number					
	1	2	3	4	5	6
Physical examination and mass (7.5)	X	X	X	X	X	X
Marking (6)	X	X	X	X	X	X
Capacity test (7.8)	X	X	X	X	X	X
Air pressure test (7.6)	X	X	X	X	X	X
Polarity and absence of short circuit (7.11)	X	X	X	X	X	X
Non-spillability test (7.7)	X	X	X	X	X	X
Retention of charge (7.12)	—	—	X	X	—	—
Life test (7.9)	—	—	—	—	X	X
Drop test (7.10)	X	X	—	—	—	—

6 MARKING

6.1 Each battery shall be distinctly and durably marked to indicate the following particulars:

- Indicating the source of manufacture,
- Country of origin,
- Voltage,
- Maximum nominal bulb rating for which the battery is designed, and

7.1.1.3 If any of the samples fail in the relevant type test, the testing authority may call for fresh samples not exceeding twice the original number and subject them again to the test(s) in which failure occurred. If there is any failure in the retest(s) the type shall be considered as not having passed the requirements of this standard.

7.1.2 Acceptance Tests

The following shall comprise the acceptance tests:

- a) Physical examination and mass (7.5),
- b) Air pressure test (7.6),
- c) Non-spillability test (7.7), and
- d) Capacity test (7.8).

7.1.3 Sampling Scheme and Criteria for Acceptance

The sampling scheme and the criteria for acceptance shall be in accordance with IS 10918 : 1984.

7.1.4 Routine Tests

The following shall constitute the routine tests:

- a) Physical examination and mass (7.5), and
- b) Air pressure test (7.6).

7.2 Temperature for Tests

7.2.1 The capacity and life tests specified in this standard shall be carried out at an ambient temperature of $27 \pm 2^\circ\text{C}$.

7.2.1.1 It is preferable to conduct the tests in an air-conditioned room maintained at the standard temperature specified. In case, however, such an arrangement is not available, the tests shall be carried out at the standard temperature maintained by any suitable mean.

7.3 Test Equipment

7.3.1 Voltmeter

The voltmeter used for tests shall be of an accuracy class not inferior to 0.5 in accordance with IS 1248 (Part 2) : 1983. The resistance of the voltmeter used shall be at least 1 000 ohms per volt. The range of voltmeter used shall be such that the magnitude of the voltage to be measured falls in the last third part of the scale.

7.3.2 Ammeter

The ammeter used for tests shall have an accuracy class not inferior to 1.0 [see IS 1248 (Part 2) : 1983]. The range of ammeter used shall be such that the magnitude of the current to be measured falls in the last third part of the scale.

7.3.3 Thermometer

Thermometers with an appropriate scale shall be used for measuring temperatures, and one division of the graduated scales shall represent at the most 1°C . The accuracy of the calibration shall be not less than 0.5°C .

7.4 First Charge

The battery shall be first charged in accordance with the manufacturer's instructions.

7.5 Physical Examination and Mass

The batteries shall conform to the requirements of 5.

7.6 Air Pressure Test

The sealing of each cell of the battery shall be checked by compressed air at a pressure equal to 700 mm height of water column. The volume of the tubes and ancillary parts connected to the cell under pressure shall not exceed 0.5 litre.

7.6.1 Requirement

The air pressure shall not fall below 670 mm of water column in 15 seconds after the air supply to the cell is disconnected.

7.7 Non-spillability Test

The charged battery after 2 hours rest shall be subjected to a static non-spillability test by keeping it upside down for 2 hours.

7.8 Capacity Test

7.8.1 The battery shall be prepared and charged in accordance with the manufacturer's instructions.

7.8.2 The battery may be discharged and charged for one condition cycle prior to capacity test.

7.8.3 After not less than 2 hours and not more than 24 hours from the completion of the charge in accordance with the manufacturer's instructions, and at an ambient temperature of $27 \pm 2^\circ\text{C}$, the battery shall be discharged continuously through a suitable resistance at a constant current of 0.1 C A until the battery terminal voltage falls to 3.3 V and 2.2 V for 3.6 V and 2.4 V battery respectively.

7.8.4 Requirement

The battery shall have a duration of not less than 12 hours till the out off voltage becomes 3.3 V and 2.2 V for 3.6 V and 2.4 V respectively.

7.9 Life Test

7.9.1 The life test shall be performed on two batteries which have passed the tests in accordance with 7.5, 7.6, 7.7 and 7.8.

7.9.2 Each battery shall be subjected to a series of continuous charges and discharges as follows:

- a) Discharge continuously at a current of 0.08 CA for 9 hours through a suitable resistance.
- b) Recharge for a period of 15 hours at a constant current source of 0.1 CA.
- c) The sequences of discharges and charges are repeated, one complete cycle being completed in 24 hours.

7.9.3 After every 25 cycles, each battery may be subjected to a full recharge in accordance with the manufacturer's instructions.

7.9.4 After each series of 100 cycles up to the 500 cycles and after each series of 50 cycles thereafter, after correction of electrolyte levels and after receiving a recharge in accordance with the manufacturer's instructions, each battery shall be subjected to a capacity test in accordance with 7.9.5.

7.9.5 After not less than 2 hours and not more than 24 hours from the completion of charge, the battery shall be discharged at a continuous current of 0.08 CA through a suitable resistor unit the terminal voltage of the battery falls to 2.0 V and 3.0 V respectively and 2.4 V and 3.6 V battery.

7.9.6 After each capacity test, the battery shall be recharged in accordance with the manufacturer's instructions and the cycles of discharge and recharge resumed.

7.9.7 The life test is terminated when the duration of the discharge in the capacity test falls below 9.0 hours.

7.9.8 Requirement

The number of charge and discharge cycles shall be not less than 600.

7.10 Drop Test

7.10.1 Drop tests shall be conducted on two batteries which have passed the tests in accordance with 7.5, 7.6, 7.7 and 7.8.

7.10.2 A test platform shall be prepared in accordance with Annex A.

7.10.3 Each battery shall be subjected to a total of six drops on to the total platform from a height of one metre. The six drops shall comprise two on the base and one on each of the four sides of the battery

respectively. The face containing the terminals shall not strike the platform.

7.10.4 Requirement

There shall be no crack in the battery container after six drops. If the battery case falls into pieces, the battery is considered to brittle for satisfactory service and is rejected.

After six drops each battery when discharged through a suitable resistor shall give a continuous discharge of 0.06CA for 7.0 hours before the voltage at the battery terminals falls below 1.0 V per cell average.

7.11 Polarity and Absence of Short-Circuiting

7.11.1 The polarity of plates in relation to that of the terminals or inter-cell connectors to which they are connected shall be verified electrically.

7.12 Retention of Charge

7.12.1 The battery shall be fully charged according to manufacturer's instructions and shall then be subjected to two consecutive capacity tests in accordance with 7.8. The value of the initial capacity C_i being calculated as the mean of the two results thus obtained. After a complete recharge and cleaning of electrolyte from its surface, the battery shall then be left on open circuit for a period of 28 days without disturbance at $27 \pm 5^\circ\text{C}$.

7.12.2 After 28 days storage, the battery shall be discharged in accordance with 7.8. The value of capacity obtained after storage is denoted as C_s . The loss of capacity 'S' expressed as percentage is calculated from the following formula:

$$S = \frac{C_i - C_s}{C_i} \times 100$$

The loss in the capacity 'S' shall not exceed 25 percent.

ANNEX A

(Clause 7.10.2)

TEST PLATFORM FOR DROP TEST

A-1 The test platform will be a square block 450×450 mm comprising 25 mm thick wooden boards laid over a concrete block 90 mm thick making up a total height of 115 mm.

A-2 The wooden boards shall be selected from one of the following woods and shall be well seasoned and free from knots:

- a) Kakko (*Albizia lebbek*),
- b) Benteak (*Lageratrolmia lanceolata*),

- c) Kindal (*Terminalia paniculate*),
- d) Kharsu (*Quercus semecarpifolia*), and
- e) Teak or Indian Teak.

A-3 CONSTRUCTION

A-3.1 Starting with a square wooden frame pour concrete to a height of 90 mm. Lay the 25 mm, floor boards over the finished concrete and plane outer frame flush with wooden flooring.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has a copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such a review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Addition'.

This Indian Standard has been developed from Doc : No. ET 11 (3252).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices:

Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

{ 331 01 31
{ 331 13 75

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola
CALCUTTA 700054

{ 37 84 99, 37 85 61
{ 37 86 26, 37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036

{ 53 38 43, 53 16 40
{ 53 23 84

Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113

{ 235 02 16, 235 04 42
{ 235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 430093

{ 632 92 95, 632 78 58
{ 632 78 91, 632 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR.
LUCKNOW. PATNA. THIRUVANANTHAPURAM.